

## The Branching Pattern of the Axillary Nerve and the Nerve to the Long Head of the Triceps Brachii

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### Introduction

The axillary nerve originates from the posterior cord of the brachial plexus at the level of the axilla and contains nerve fibers from C5 to C6. Lately, some cadaveric studies have reported that the long head of the triceps brachii muscle (LHT) is innervated by the axillary nerve. Considering this anatomical variation, it would be necessary to examine the LHT in needle electromyography for diagnosis of axillary neuropathy. The aim of the study is (1) to investigate the branching pattern of the axillary nerve in the quadrangular space and (2) to investigate the anatomical variation of the motor branch of nerve to the LHT.

### Methods

Cadaveric dissection of bilateral shoulders of six fresh cadavers was performed (Table 1). The axillary nerve was identified from the quadrangular space and its branches to nearby muscular structures were dissected. The motor branch of nerve to the LHT was carefully traced from the penetrating point into the muscles to its origin. Dissections were performed with both anterior and posterior approach.

### Results

1) The branching pattern of the axillary nerve : Eleven shoulders were examined. 3 types of variations in the course and branching pattern of the axillary nerve were noticed (Table 1). In five out of eight specimens, the axillary nerve bifurcated into anterior and posterior branches after it exits the quadrangular space. (Fig. 1; Type 1) In one specimen, the axillary nerve bifurcated into anterior and posterior branches before the quadrangular space. (Fig. 1; Type 2) The posterior branch gave off a muscular branch innervating the teres minor muscle, a branch innervating posterior part of the deltoid muscle, and then superior lateral brachial cutaneous branch. The anterior branch innervated to acromial and clavicular parts of the deltoid muscle. In two specimens, a branch innervating posterior part of the deltoid muscle was originated from the anterior branch of the axillary nerve. (Fig. 1; Type 3) 2) The motor branch of nerve to the LHT : All 12 LHTs were innervated by the radial nerve. (Table 1, Fig. 2)

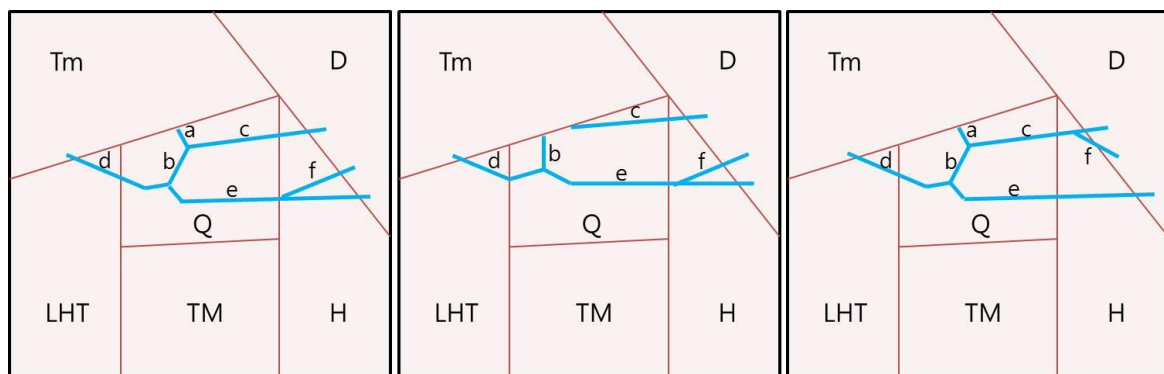
### Discussion

We noted many types of branching pattern in the axillary nerve around the quadrangular space. For example, in two specimens we found a variation that posterior branch to deltoid was originated from the anterior branch of the axillary nerve. Some articles

reported that LHT is innervated by the radial nerve or/and axillary nerve. Understanding this variation may help planning the surgical treatment of the axillary nerve injury, as a nerve transfer to the deltoid muscle using the nerve to the LHT can be chosen for restoration of deltoid muscle function in axillary nerve injuries or upper brachial plexus injuries. However, there was no anatomical variation of axillary innervation to LHT identified in the present study. We only dissected 6 cadavers, so interpretation should be cautioned and further study including many cadavers will be needed.

table1. The branching types of axillary nerve and innervation to the long head of the triceps brachii muscle in cadavers dissected. \*; because of the damage during the dissection

No.	Sex	Age	Arm	Innervation to LHT	Axillary nerve branching type
1	M	92	Rt.	Radial	Uncheckable*
			Lt.	Radial	Uncheckable*
2	F	79	Rt.	Radial	Uncheckable*
			Lt.	Radial	Type 2
3	F	85	Rt.	Radial	Type 1
			Lt.	Radial	Type 3
4	F	95	Rt.	Radial	Type 3
			Lt.	Radial	Uncheckable*
5	F	88	Rt.	Radial	Type 1
			Lt.	Radial	Type 1
6	F	94	Rt.	Radial	Type 1
			Lt.	Radial	Type 1



Type 1

Type 2

Type 3

fig 1. Schematic images of three types of branching pattern of the axillary nerve. a, main trunk of axillary nerve; b, posterior branch of axillary nerve; c, anterior branch of axillary nerve; d, branch to teres minor; e, superior lateral brachial cutaneous branch; f, posterior branch to deltoid Tm, teres minor; TM, ters major; D, deltoid; H, humerus; LHT, long head of the triceps brachii; Q, quadrangular space



fig 2.The radial innervation of the long head of the triceps brachii and adjacent muscular structures. AN, axillary nerve; RN, radial nerve; IST, infraspinatus; Tm, teres minor; TM, teres major; D, deltoid; LatHT, lateral head of triceps brachii; LongHT, long head of triceps brachii